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**Smart Telephone Call Routing For Wireless
Communication Devices**

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1 **TECHNICAL FIELD**

2 The systems and methods described herein relate to routing calls to a
3 communications carrier. More specifically, the systems and methods provide for
4 wireless communication devices to determine location of a user, locate
5 communication services accessible by the user, and instruct service providers to
6 route calls for the user to a particular communication service.

7
8 **BACKGROUND**

9 Well connected individuals may have several communication devices and
10 associated communication services. Communication devices include wireless
11 (i.e., cellular) telephones, plain old telephone service (POTS) telephones, and
12 wireless personal digital assistants (PDA). In certain cases an individual that
13 travels between different countries/regions may have particular communication
14 services (i.e., cellular networks) for each country/region. Associated with each
15 communication device is a "telephone number" used by others to contact the user
16 of the communication device. Therefore, multiple telephone numbers may be
17 associated with one individual that has multiple communication devices.
18 Typically, different service providers are associated with each communication
19 device. Different service providers may have different service rates depending on
20 the type of communication services offered.

21 Although there may be some overlap in the type and quality of
22 communication services that are provided by communication devices, particular
23 communication devices provide unique communication services that are not
24 offered by other communication devices. For example, all communications
25

1 devices provide the ability to talk to other parties; however, a cellular phone frees
2 a user from network (i.e., wired) constraints of typical POTS systems.

3 Communications services may also be distinguished from one another by
4 the type of network infrastructure they use and their cost to operate. For example,
5 a satellite telephone transmits and receives communications to and from a low
6 earth orbit satellite at a frequency known as L-band. A cellular telephone
7 transmits and receives communications from various base stations and cellular
8 antennas. Although the "same" wireless communication service is provided by a
9 satellite telephone and a cellular telephone, the method used to provide such
10 communication service is different. Considering current network infrastructures,
11 it is also more costly to operate the satellite telephone. In certain cases, a POTS
12 communication service may have a cost advantage over particular cellular and/or
13 wireless communications systems. Currently, evolving voice over internet
14 protocol (VoIP) technology is being touted as having a cost advantage over current
15 POTS communication services regarding long distance calls.

16 Communication services may vary from one another in terms of quality of
17 service. For example, communication service for a hardwired POTS telephone
18 often is clearer than communication service for a cellular or VoIP telephone.

19 A party that attempts to contact an individual may have one or a limited
20 number of telephone numbers, but not all telephone numbers to contact the
21 individual. For instance, the party may have a cellular telephone number of the
22 individual, but not the individual's POTS telephone number (e.g., the individual
23 does not want everyone to have his home telephone number). And if the
24 individual is at home, it may be more cost effective for the individual to receive
25 calls on the POTS telephone, instead of the cellular telephone.

1 From the perspective of the calling party, it is frustrating to receive a busy
2 answer or no answer. The receiving individual may have another telephone line
3 available which the calling party may connect to; however, the calling party may
4 not know the telephone number to access the available telephone line. As a result,
5 the calling party is not able to make direct communication with the individual.

6 7 **SUMMARY**

8 The systems and methods described herein include identifying the location
9 of a user, locating communication services available to the user, choosing a
10 particular communication service, and routing calls to the chosen communication
11 service.

12 Locating communication services, in particular may be performed by
13 identification of communication networks by a wireless communication device,
14 where the cellular networks may be particular cellular networks and/or wireless
15 area networks of particular communication services.

16 Forwarded calls may be sent to the wireless communication device, or
17 alternatively to another communication device.

18 19 **BRIEF DESCRIPTION OF THE DRAWINGS**

20 Fig. 1 is a block diagram illustrating an exemplary system that locates a
21 user through a wireless communication device and forwards calls to the user
22 through one of various communication services.

23 Fig. 2 is a block diagram illustrating an exemplary system that routes calls
24 from various service providers to various carrier networks as instructed by a
25 forwarding system in a wireless communication device.

1 Fig. 3 is block diagram illustrating an exemplary architecture of a wireless
2 communication device and in particular illustrates an exemplary call forwarding
3 system included in the wireless communication device.

4 Fig. 4 is a flowchart illustrating a process that locates a user through a
5 wireless communication device, determines communication services available to
6 the user, and provides call forwarding instructions to a chosen communication
7 service.

8 Fig. 5 is a flowchart illustrating heuristics or conditions set by a user that
9 determine which communication service is chosen and receives forwarded calls.

10 11 **DETAILED DESCRIPTION**

12 **Example Telecommunications System**

13 Fig. 1 shows a system 100 that locates a user and forwards calls to the user
14 through a communication service.

15 A wireless communication device 105, such as a cellular (i.e., wireless)
16 telephone, or a wireless-enabled personal digital assistant (PDA), is carried by a
17 user. It is presumed that wherever the wireless communication device 105 goes,
18 so will the user. Therefore, as the user enters and leaves communication networks,
19 such as cellular networks or wireless local area networks (WLAN) that provide
20 POTS or VoIP telephones, wireless communication device 105 will also enter and
21 leave. Essentially, the user is tracked and located by wireless communication
22 device 105.

23 As the user and wireless communication device 105 enter a particular
24 communication network, it may be desirable for the user to receive calls from that
25 particular communication network. Wireless communication device 105 includes

1 a forwarding system 110 that instructs service providers 115(1), 115(2), ...115(N)
2 to forward calls to a particular communication service supporting the particular
3 communication network. Specifically, calls are forwarded to a carrier network or
4 networks of the particular communication service, as will be discussed below.

5 The user has communication services that include associated telephone
6 numbers with each of the service providers 115. When forwarding instructions are
7 provided by forwarding system 110 to service providers 115, calls made to
8 telephone numbers of the service providers 115 are routed to the communication
9 service of the desired communication network. Service providers 115 may include
10 cellular telephone service providers, POTS service providers, VoIP service
11 providers, and satellite telephone service providers.

12 As further discussed below, service providers 115 may include routers to
13 carrier networks that are part of a communication services or part of a
14 telecommunication network 120. Telecommunication network 120 includes
15 various backbone networks, hubs, routers, interchange trunks, wireless/wired
16 lines, and switches. Further, telecommunications network 120 may connect to a
17 number of other networks, including other telecommunication networks and
18 devices.

19 Telecommunication network 120 may include or be connected to a local
20 cellular network 125 and a roaming cellular network 130. Wireless
21 communication device 105 may be configured to receive and send calls on cellular
22 networks 125 and 130. As the user travels or roams with wireless communication
23 device 105, the user may enter cellular networks 125 and 130. In particular
24 situations, coverage of cellular networks 125 and 130 overlap one another and in
25 certain cases coverage is exclusive to each cellular network.

1 Wireless communication device 105 is configured to detect cellular
2 networks 125 and 130 through well known methods employing system
3 identification number (SID) and access information that are passed between
4 wireless communication device 105 and cellular networks 125 and 130.
5 Therefore, wireless communication device 105 is configured to determine which
6 cellular network is available. Assuming that calls on local cellular network 125
7 are "free" calling minutes, it would be ideal to connect with (i.e., receive calls
8 from) cellular network 125 whenever possible, instead of roaming cellular
9 network 130 which may apply significant rates for received calls. Whenever
10 cellular networks 125 and 130 overlap, quality of service being equal (or
11 acceptable to the user), it would be more desirable (i.e., more cost effective) to
12 receive service from local cellular network 125. Forwarding system 110 of
13 wireless device 105 instructs service providers 115 to forward calls to the local
14 cellular network 125.

15 Other cases may include roaming into a high price service network. Instead
16 of receiving calls when in the high price network, wireless communication device
17 105 through forwarding system 110, instructs that calls are forwarded to another
18 telephone number or communication service (i.e., carrier network) such as voice
19 mail on a POTS telephone. Once wireless communication device 105 enters or re-
20 enters an acceptable network, calls may be received by wireless communication
21 device 105.

22 In certain cases, the user may be carrying other wireless communication
23 devices, such as cellular telephone 132, besides wireless communication device
24 105. Cellular telephone 132 may be communicative to particular communication
25 networks such as cellular network 134 that can not be accessed by wireless

1 communication device 105. For example, wireless communication device 105
2 may not have a particular personal communication service (PCS) technology used
3 by cellular network 134; however, cellular telephone 132 may be equipped with
4 such PCS technology to communicate with cellular network 134. Or cellular
5 network 134 may not recognize the SID of wireless communication device 105
6 and is not able to establish a connection. Therefore, when only cellular network
7 134 is available to the user, it may be desirable to forward calls to cellular
8 telephone 132.

9 In certain cases, the user may be in a location that provides no access to
10 cellular networks, POTS networks, or any wired/wireless communication network.
11 The only means of communication may be through a satellite telephone 135.
12 Satellite telephone 135 communicates with a low earth orbit satellite 140 which
13 connects through a gateway (typically known in the industry as an "Iridium"
14 gateway) to telecommunications network 120.

15 If desired by the user, calls may be forwarded by forwarding system 110 to
16 be received by satellite telephone 135. An example scenario of when this takes
17 place is when wireless communication device 105 detects no presence of
18 communication networks, cellular or WLAN. However, since wireless
19 communication device 105 cannot connect to communication network 120 to
20 instruct that calls be forwarded, a prior arrangement may be made with service
21 providers 115 that if wireless communication device 105 cannot be reached (i.e.,
22 assumption is made that user and wireless communication device 105 are away
23 from any other communication networks), to forward all calls to satellite telephone
24 135.

1 A prior arrangement may also be made that if wireless communication
2 device cannot be reached, to have service providers 115 forward calls to a cellular
3 network such as cellular network 134 which allows the user to communicate on
4 cellular telephone 132. Alternatively, the prior arrangement may be to have calls
5 forwarded to a voice mail of a POTS communication service.

6 Accurately locating wireless communication device 105, and its location to
7 communication networks (i.e., communication services) available to the user, may
8 be performed through the use of a global positioning satellites (GPS) locator, a
9 map, and a database in wireless communication device 105. The GPS locator
10 receives signals from four GPS satellites 145(1), 145(2), 145(3), and 145(4).
11 Based on distance from the four satellites 145 to the GPS locator of wireless
12 communication device 105, triangulation is performed to locate wireless
13 communication device 105.

14 The map and database in wireless communication device 105 indicates the
15 locations of communications networks that are accessible by the user. A
16 comparison may be made of the derived location from the GPS locator (i.e.,
17 wireless communication device 105) in relation to the communication networks.
18 The comparison relates to proximity of wireless communication device 105 and
19 the user to particular communication networks. If the user is near a particular
20 communication network, it may be desirable to forward calls to that particular
21 communication network. For example, the GPS locator of wireless
22 communication device 105 determines that the user is near a home POTS
23 communication network, and forwarding system 110 sends forwarding
24 instructions to service providers 115 to forward calls to the home POTS
25 communication network.

1 System 100 may further include plain old telephone systems (POTS) that
2 typically have a hardwire connection (e.g., copper wire or fiber optic wire) to
3 telecommunications network 120. In this example, POTS network 150 is
4 connected to telecommunication network 120. POTS network 150 may represent
5 the user's home communication network or the user's office communication
6 network. Typically POTS network 150 is referred to as a "land line."

7 POTS network 150 may include or be connected to a POTS telephone 155
8 and a VoIP telephone 160. POTS network 150 may further connect to the Internet
9 165 which connects to telecommunications network 120.

10 POTS network 150 may be a wireless local area network (WLAN), a
11 wireless personal area network (WPAN), wireless point to point networks, or one
12 of various networks that include wireless and wired connections. POTS network
13 150 may include a number of wireless protocols such as IEEE 802.11, Bluetooth,
14 and WiFi.

15 Wireless communication device 105 is enabled with one or more antennas
16 or antenna modules capable of receiving and transmitting various RF frequency
17 signals, and is either able to directly connect to POTS network 150 through one of
18 several access points, or may detect the presence of network 145 through the RF
19 transmission of the access points. The wireless protocols define particular access
20 points that are part of a wireless network. Access points allow devices such as
21 wireless communication device 105 to communicate to the wireless network (e.g.
22 POTS network 150 that includes the wireless network) or to devices that part of
23 the wireless network.

24 Wireless networks may be distinguished from one another through the use
25 of a service set identifier (SSID) that identifies a particular wireless network to

1 properly configured wireless devices. The SSID is a unique 32-character identifier
2 that is part of a header of packets of information that are sent over a wireless
3 network. A wireless device and a particular access point of a wireless network
4 must have the same SSID to communicate, since SSIDs are used to differentiate
5 one wireless network from another. For example, a wireless network at home may
6 be identified as "MyHomeSSID" and a wireless network at work may be identified
7 as "MyWorkSSID". Therefore, whenever a wireless device enters a particular
8 wireless network, through the SSID the wireless device "knows" that it is in the
9 particular wireless network.

10 When wireless communication device 105 attempts to connect to an access
11 point of a wireless network connected to POTS network 150, a SSID is used as a
12 "password" to connect to the wireless network. A SSID may be viewed by the
13 user in a display of the wireless communication device 105.

14 Wireless communication device 105 may be configured to search for and
15 identify wireless networks through a SSID. The identification of SSIDs and their
16 associated wireless networks, may be used in locating wireless communication
17 device 105 (and the user). For example, when the SSID "MyHomeSSID" is
18 identified by wireless communication device 105, it is assumed that the user is at
19 home, and that calls if so desired may be forwarded by forwarding system 110 to
20 the user's POTS telephone which may be POTS telephone 155.

21 In certain cases, the use of a SSID as described above may not be needed to
22 merely identify that the wireless communication device 105 has entered a wireless
23 network. In particular, Bluetooth enabled devices are able to communicate with
24 one another without the use of an SSID. Wireless communication device 105 may
25

1 be configured with Bluetooth hardware and software to communicate with devices
2 (wireless and wired) connected to POTS network 150.

3 **Example Routing System**

4 Fig. 2 is a block diagram illustrating an exemplary system 200 that routes
5 calls as instructed by a wireless communication device. The forwarding system
6 110 of wireless communication device 105 of Fig. 1 provides forwarding
7 instructions to service providers 115 to forward calls destined to the user. In
8 particular, a service provider routes calls to a particular carrier network which
9 sends the calls either to wireless communication device 105 or another
10 communication device such as a land line POTS telephone accessible by the user.
11 Typically, a communication service includes a service provider and a particular
12 carrier network or carrier networks.

13 As discussed above, service providers 115 receive calls from other parties
14 directed to the user. As instructed by forwarding system 110, service providers
15 115 forward their received calls for the user to a particular carrier that is associated
16 with a telephone number provided by the forwarding system 110, where the
17 telephone number represents a particular communication system for a
18 communication device. The communication device may be either wireless
19 communication device 105 or some other communication device.

20 Service providers 115 include or are connected to particular routers 205(1),
21 205(2), ..., 205(N). Routers 205 are configured to route calls to one or more
22 carrier networks 210(1), 210(2), ..., 210(N).

23 Typically, without call forwarding instructions indicating otherwise, a
24 service provider routes all incoming calls to its particular carrier network or
25

1 networks, which in turn sends the call to the communication device associated
2 with the service provider.

3 Call forwarding instructions provide that a service provider route calls to
4 particular carrier networks as instructed by a user, and particularly in this example
5 by forwarding system 110. Unconditional call forwarding instructions provide
6 that all calls received by the service provider are routed to a particular telephone
7 number(s). This is performed by routing the forwarded calls to carrier networks
8 associated with the particular telephone number(s). Conditional call forwarding
9 instructions provide that some calls received by a service provider are routed
10 based on a defined criteria such as "no answer", "busy", "caller identification of
11 incoming call", and "time of day".

12 Call forwarding instructions may instruct service providers 115 to forward
13 calls to the same communication device (i.e., same telephone), or may instruct
14 service providers 115 to forward calls to different communication devices (i.e.,
15 different telephones).

16 Carrier networks 210 may be separate from and connect to a network such
17 as a telecommunication network 120 of Fig. 1. In other cases, carrier networks
18 210 may be part of telecommunication network 120.

19 As discussed above, a communication service includes a service provider
20 and one or more carrier networks. A particular telephone number is associated
21 with a particular communication service. Therefore, when a party calls a
22 particular telephone number of the user, the call is sent to a service provider
23 associated with the telephone number. Without call forwarding instructions, the
24 call is routed to the carrier network of the service provider.

25

1 When call forwarding instructions are provided by forwarding system 110,
2 the service providers 115 reroute received calls to particular carrier networks of
3 particular communication services.

4 **Exemplary Wireless Communication Device**

5 Fig. 3 shows an example architecture 300 of a wireless communication
6 device. Architecture 300 may be implemented on wireless communication device
7 105 of Fig. 1. In particular, architecture 300 may be implemented as part of
8 wireless communication device 105.

9 Architecture 300 includes an antenna module 305 that is configured to
10 receive and transmit one or more RF signals at various operating frequencies, in
11 particular RF signals based on cellular or wireless communications. Antenna
12 module 305 may be further configured to receive and transmit RF transmissions
13 based on Bluetooth, IEEE 802.11, WiFi, and/or any one or several other wireless
14 protocols, in particular RF transmissions based on wireless networks. Antenna
15 module 305 may further be configured to receive GPS signals transmitted from
16 GPS satellites.

17 Architecture 300 includes an analog to digital, digital to analog (A/D, D/A)
18 converter module 310. Converter module 310 is used to convert analog RF signals
19 from antenna module 305 into digital signals that are processed by architecture
20 300. When transmitting, converter module 310 takes digital signals processed by
21 architecture 300 and converts them to the appropriate analog RF signals to be
22 transmitted. The particular RF signals are dependent on the particular wireless
23 technology that is used for communication. For example, cellular telephone RF
24 transmission frequencies are different than Bluetooth enabled transmission
25

1 frequencies. Further, a wireless PCS network may have different operating
2 frequencies from an analog cellular network.

3 Architecture 300 may include a dedicated GPS locator module 315 that is
4 configured to receive GPS satellite information from GPS satellites such as
5 satellites 145 of Fig. 1. GPS locator module 315 is operatively connected to
6 converter module 310 to receive digitally converted satellite signals received by
7 antenna module 305.

8 Architecture 300 includes one or more processors 320. Processors 320 are
9 configured through hardware, software, or a combination, to handle information
10 received from converter module 310 and coordinate such information and other
11 information with input/output devices that are part of wireless communication
12 device architecture 300 such as a speaker, keyboard (keys), an amplifier, or the
13 like. Processors 320 are further configured to process information stored in
14 memory, devices and modules such as GPS locator module 315 that are part of
15 architecture 300. Processors 320 are particularly configured to detect when RF
16 transmission is received by antenna module 305 that indicates communication
17 networks or wireless networks (e.g., WLAN) that are available to the user.

18 Architecture 300 further includes a memory 325 which interfaces with
19 processors 315. Processors 315 further communicate with information stored in
20 memory 325 with other modules in architecture 300. Memory 325 includes
21 computer readable media. Although sections of memory 325 may include read
22 only memory, it is contemplated that memory 325 will include writeable sections
23 or volatile memory which may be updated or written to.

24 Memory 325 includes GPS maps 330 that are used with information
25 received by GPS locator module 315 to indicate location of the wireless

1 communication device which translates to the location of the user. Memory 325
2 further includes a database of networks 335 that indicates the location of
3 communication networks available to the user. The database 335 may be used
4 with GPS maps, and the information received from GPS locator module 315, to
5 indicate available communication networks that are proximate to the wireless
6 communication device and the user.

7 Memory 325 may include a section 340 with SID numbers that are
8 associated with cellular networks, and particularly cellular networks accessible by
9 architecture 300. The SID information is used, as described above to distinguish
10 cellular networks from another and connect architecture 300 to particular cellular
11 networks. It is contemplated that section 340 may be updated as the user adds or
12 deletes available wireless communication networks.

13 Memory 325 may include a section 345 with SSID numbers that are
14 associated with wireless communication networks, and particularly wireless
15 communication networks that provide communication services to the user. In
16 certain embodiments, the information describing SSID numbers in section 345
17 may be part of database 335. The SSID information is used, as described above,
18 to distinguish wireless communication networks from one another, and to connect
19 the wireless communication device incorporating architecture 300 to particular
20 wireless communication networks. It is contemplated that section 345 may be
21 updated as the user adds or deletes available wireless communication networks.

22 A section 350 includes call forwarding instructions. Section 350 may be
23 updated to provide particular user defined or chosen heuristics that instruct which
24 communication service(s) to forward calls to, when call forwarding instructions
25 are sent to service providers, and priority of communication services that

1 forwarded calls are sent to. Such call forwarding instructions may include
2 particular conditions such as duration to maintain call forwarding to the particular
3 communication service(s). Alternatively, the call forwarding instructions may be
4 unconditional and changed only when the wireless communication device instructs
5 otherwise.

6 A user may have a menu set up as a display configured with architecture
7 300 to choose particular instructions. The menu may be in the form of a graphical
8 user interface, or a list of items to choose from. Further the user through an
9 input/output interface to architecture 300, may enter particular call forwarding
10 instructions.

11 **Exemplary Call Forwarding Process**

12 Fig. 4 shows a process 400 that instructs incoming calls directed to a
13 communication device to be forwarded to a communication service that might
14 forward the calls to the same or a different communication device based on user
15 defined heuristics. Process 400 may be implemented on a wireless communication
16 device such as wireless communication device 105 of Fig. 1.

17 At block 405, a user's location is determined by locating a wireless
18 communication device such as wireless communication device 105. In particular,
19 the wireless communication device's location is determined using methods
20 described above, such as the use of a GPS locator, detecting (i.e., connecting to)
21 cellular or wireless networks, and/or detecting (i.e., connecting to) wireless local
22 area networks that make use of wireless communication protocols using SSID
23 and/or protocols such as Bluetooth.

24 At block 410, available communication services to the user are determined.
25 In particular, availability of communication networks that provide communication

1 service to the user is determined. The availability of the communication networks
2 to the user is conditioned on the user's location as determined in block 405. For
3 example, if the user is determined to be "near" home, communication service
4 provided for home is available to the user. If the wireless communication device
5 enters a particular cellular network, communication service for that cellular
6 network may be available to the user. In certain cases, the communication service
7 supports the wireless communication device, and in other cases the
8 communication service supports another communication device. In other words,
9 the user may have communication service available through more than one
10 communication device.

11 At block 415, a determination is made as to whether an available
12 communication service is to be used. The determination is performed based on
13 user defined conditions as described below. In certain cases, it may be desirable to
14 have calls forwarded to a carrier network of an available communication service.
15 Although the user enters a communication network, and communication service is
16 available, there may be no desire or need to change from the present
17 communication service to the newly identified communication service. For
18 example, when the user is operating in a local cellular network then enters a
19 roaming cellular network that overlaps the current local cellular network. As
20 discussed above, for certain cases, a chosen communication service provides calls
21 to a communication device other than the wireless communication device that is
22 used to locate the user.

23 At block 420, call forwarding instructions are sent to service providers to
24 forward calls to a carrier network or carrier networks of a chosen communication
25

1 service. Such instructions may be located in and provided by section 350 of Fig.
2 3.

3 Different call forwarding instructions allow different permutations for
4 routing telephone calls. Examples of different telephone routing situations include
5 calls be routed to the same telephone using different service providers; calls routed
6 to the same telephone using the same service provider; calls routed to different
7 telephones using different service providers; and calls routed to the different
8 telephones using the same service provider.

9 **Example User Defined Heuristics to Connect to Communication Service**

10 Fig. 5 shows a process 500 that determines which communication service is
11 chosen and receives forwarded calls. Process 500 may be implemented as part of
12 call forwarding instructions resident in section 350 of Fig. 3. It is contemplated
13 that a user chooses, defines, or determines the conditions or heuristics that
14 determine a particular communication service to connect to. The conditions and
15 heuristics illustrated are shown as examples, with numerous conditions and
16 heuristics that may be possible. Such call forwarding instructions may be sent by
17 call forwarding system 110 of wireless communication device 105 of Fig. 1.

18 At block 505, a determination is made if a user has defined particular
19 conditions to instruct service providers to forward calls to a particular
20 communication service. These particular user defined conditions may include
21 conditions related to time of day (e.g., a user desires to call forward all calls after
22 5:00 to his home communication service provider and its associated carrier
23 network or networks); and/or location (e.g., a user carrying a wireless
24 communication device such as wireless communication device 105 of Fig. 1 enters
25

1 an unknown or high cost to operate network instructs that all calls are forwarded to
2 another communication service such as home voice mail).

3 If a particular user defined condition (heuristic) is found to be true
4 (following the YES branch of block 505), block 510 is performed which provides
5 that call forward instructions are sent to service providers providing
6 communication services to the user to call forward all calls to the particular
7 communication service as determined by the user condition (heuristic) in block
8 505.

9 In certain cases, the user may desire to switch to the lowest cost to operate
10 communication network. If no particular user defined heuristics are set or met
11 (following the NO branch of block 505), a determination is made at block 515 if
12 amongst all available communication services there is a lowest cost to operate
13 communication service. An example includes operating within overlapping
14 cellular or wireless networks as discussed above. Everything else being equal, it
15 would be more desirable to operate in a cellular network that provides "free"
16 minutes over another cellular network that is charging roaming rates. Another
17 example may be to use a VoIP telephone over a POTS telephone for long distance
18 calls, if such a choice of communication service is available. If a lowest cost to
19 operate communication service is found (following the YES branch of block 515),
20 block 510 is performed.

21 If the user does not desire or does not care to connect to the lowest cost to
22 operate communication service (following the NO branch of block 515), it may
23 desirable to the user to connect to a communication service that provides the
24 highest quality of service available. At block 520, the communication service with
25 the highest available quality of service is selected. An example of a

1 communication service that has the highest quality of service can be a land line
2 connected POTS telephone over a cellular telephone with a failing connection
3 signal. When the communication network with the highest quality of service is
4 determined, block 510 is performed.

5 For other cases, the precedence of blocks 505, 515, and 520 will be in a
6 different order as described. Other cases may provide different heuristics or
7 conditions that will determine the particular communication service to connect to.

8 Although the invention has been described in language specific to structural
9 features and/or methodological acts, it is to be understood that the invention
10 defined in the appended claims is not necessarily limited to the specific features or
11 acts described. Rather, the specific features and acts are disclosed as exemplary
12 forms of implementing the claimed invention.